What is claimed is:

1. A broadband superfluorescent device comprising:

a seed source that provides an optical input;

a modulator operably coupled to the seed source; and

a polarization maintaining (PM) amplifier operably coupled to the modulator;

wherein the seed source optical input is polarized in the modulator so that a polarized output is outputted therefrom;

wherein the polarized optical output of the modulator is inputted to the PM amplifier; and

wherein the PM amplifier is configured and arranged so as to amplify an intensity of the polarized optical output from the modulator and to output an amplified polarized optical output therefrom.

2. The broadband superfluorescent device of claim 1, wherein the seed source comprises a light source capable of producing a light at a preselected wavelength and an optical fiber doped with a pre-selected gain material operably coupled to the light source.

3. The broadband superfluorescent device of claim 2, wherein said light source capable of producing light at a preselected wavelength is a pump diode.

4. The broadband superfluorescent device of claim 2, wherein the pre-selected gain material is a rare-earth dopant.

5. The broadband superfluorescent device of claim 4, wherein the rare-earth dopant is selected from the group consisting of erbium, holmium, neodymium, praseodymium and ytterbium.

6. The broadband superfluorescent device of claim 4, wherein the rare-earth dopant is erbium.

7. The broadband superfluorescent device of claim 1, wherein the PM amplifier comprises:

an amplification light source that generates light at a preselected wavelength;

a second doped optical fiber doped with a pre-selected gain material and being operably coupled to the amplification light source;

a retro-reflecting orthogonal polarization converter operably coupled to the second doped optical fiber;

wherein the amplification light source, the second doped optical fiber and the retro-reflecting orthogonal polarization converter are configured and arranged so the PM amplifier amplifies the polarized optical output from the modulator and provides a polarized amplified optical output therefrom.

8. The broadband superfluorescent device of claim 7, further comprising a V-grooved optical fiber being operably coupled to the amplification light source and the second doped optical fiber and wherein the light produced by the amplification light source is injected into the second doped optical fiber via the V-grooved optical fiber.

9. The broadband superfluorescent device of claim 8, wherein the amplification light source is a pump diode.

10. The broadband superfluorescent device of claim 7, wherein the second doped optical fiber is a double-clad optical fiber and wherein the pre-selected gain material is at least one rare-earth dopant.

11. The broadband superfluorescent device of claim 10, wherein the at least one rare-earth dopant is selected from the group consisting of erbium, holmium, neodymium, praseodymium and ytterbium.

12. The broadband superfluorescent device of claim 10, wherein the double-clad optical fiber is doped with erbium and ytterbium.

13. The broadband superfluorescent device of claim 7, wherein the retro-reflecting orthogonal polarization converter is a Faraday mirror.

14. The broadband superfluorescent device of claim 1, wherein the modulator is a polarizing electro-optic modulator.

15. The broadband superfluorescent device of claim 14, wherein the modulator is a proton exchanged $LiNbO_3$ Mach Zhender interferometer.

16. The broadband superfluorescent device of claim 1, further including a feedback circuit that provides a control signal to the modulator and wherein a portion of the polarized, amplified optical output from the PM amplifier is tapped off from the main beam and processed by the feedback circuit.

17. The broadband superfluorescent device of claim 16, wherein the feedback circuit comprises a detector and an amplifier operably connected to the detector;

wherein the detector outputs a signal to the amplifier representative of intensity of the tapped light;

wherein the signal from the detector is converted by the amplifier into a control signal that is outputted to the modulator; and

wherein the modulator adjusts a transmissivity of the modulator responsive to the control signal.

18. The broadband superfluorescent device of claim 17, wherein the amplifier is a noise feedback AC amplifier.

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19. A broadband superfluorescent device comprising:

a seed source providing an optical input wherein the seed source includes a light source capable of producing light at a preselected wavelength and a first optical fiber doped with a preselected gain material operably coupled to said light source;

a modulator operably coupled to said seed source wherein the optical input from the seed source is polarized and noise reduced in the modulator; and

a polarization maintaining amplifier operably coupled to said modulator, wherein the polarization maintaining amplifier comprises:

a polarizing beamsplitter;

a light source capable of producing light at a preselected wavelength operably coupled to said beamsplitter;

an optical fiber doped with a preselected gain material operably coupled to said light source; and

a retro-reflecting orthogonal polarization converter operably coupled to said optical fiber;

wherein the light entering and exiting the polarization maintaining amplifier is maintained in a polarized condition; and

wherein the intensity of the light entering the polarization maintaining amplifier is increased.

20. The broadband superfluorescent device of claim 19, wherein a portion of the optical output is tapped off from the main beam and passed through a feedback circuit into the modulator;

wherein the feedback circuit comprises a detector and an amplifier operably connected to the detector;

wherein an intensity of the tapped light is determined by the detector;

wherein the tapped light is converted by the amplifier into an electrical signal which is proportional to the intensity of the tapped light; and

wherein the electrical signal from the tapped light serves to control the transmissivity of the modulator.

21. A method for producing a polarized, broadband optical output comprising the steps of:

providing an optical input;

polarizing said optical input in a modulator to produce polarized light;

amplifying the polarized light using a polarization maintaining amplifier;

sampling a portion of the optical output and converting the output to an electrical signal proportional to the signal intensity of the output; and

controlling the transmissivity of said modulator via said electrical signal produced from said optical output.

22. A method for reducing the relative intensity noise in an optical output of polarized, broadband light comprising the steps of:

providing an optical input;

polarizing said optical input in a modulator to produce polarized light;

amplifying the polarized light using a polarization maintaining amplifier;

sampling a portion of the optical output and converting the output to an electrical signal proportional to the signal intensity of the output; and

controlling the transmissivity of said modulator via said electrical signal produced from said optical output.

23. The method of claim 21, further comprising the step of sourcing the optical output of polarized, broadband light to a fiber optic gyro.

24. The method of claim 21, further comprising the step of sourcing the optical output of polarized, broadband light to a strain sensing array.